

ALTERNATIVES ANALYSIS
TEXAS LEHIGH CEMENT COMPANY LP
PROJECT DILLON IMPORT TERMINAL
HARRIS COUNTY, TEXAS

1.0 INTRODUCTION

LNV, Inc. (LNV) on behalf of Texas Lehigh Cement Company, L.P. (TLC) has prepared this alternatives analysis for the proposed import terminal project to further justify the preferred site location and design with consideration to environmental impacts and constructability concerns. TLC proposes to construct and operate a ship import terminal to supply their processing facility located on Buffalo Bayou (Houston Ship Channel) in Harris County, Texas. The proposed project consists of the construction of a steel sheetpile bulkhead, ship dock, breasting dolphins, mooring dolphins, on-site roads and rail spurs. The proposed project also includes dredging.

The following sections detail the alternatives analysis study completed to support U.S. Army Corps of Engineers (USACE) Permit Application (SWG-2018-00181), as well as methods to be implemented to minimize potential impacts to waters of the U.S. (WOUS).

2.0 NEED AND PURPOSE

TLC presently manufactures and markets four different types of construction cement, three API Spec Oil Well Cements (Class A, Class C, and Class H), and masonry cements to its Texas and out-of-state customers. TLC's corporate office is located in Buda, Texas, where a plant/terminal is also located. TLC additionally has Corpus Christi, Houston, Roanoke, and Waco, Texas terminals, as well as two Houston Cement Company locations (east and west). The company's objective is to be the highest quality, low-cost producer of cement products in Texas.

TLC aims to support their client base in Texas, and out-of-state, by providing an additional, proprietary, construction cement material. In order to achieve this, TLC needs to import overseas raw material via ship for processing at their Texas Commission on Environmental Quality (TCEQ) permitted processing facility, located at 9500 Clinton Drive, Houston, Texas. The purpose of the proposed project is to construct a ship unloading dock capable of accommodating ships with imported overseas raw material, which could then be directly loaded into TLC's existing processing building in Houston. The proposed project would also include construction of on-site rail lines and roadways to queue rail cars and trucks for transportation of processed material to market.

3.0 PROJECT SITING CRITERIA

To achieve the project's need and purpose, the selected site needs to have a ship dock that can accommodate the largest ship anticipated to berth at the site (40,000 DWT Design Vessel 689' LOA x 95'-9" BM), adequate ship channel area for safety and navigability of incoming and outgoing vessel traffic, sufficient railroad track length to accommodate 40 queued rail cars, on-site roads to queue trucks, and a location close to TLC's existing processing facility so that the material imported from overseas can be unloaded directly from the ships to the processing building to minimize handling of the material.

Based on these needs, the following siting criteria were developed:

1. Direct access to Houston Ship Channel, highways, and existing rail lines.
2. Sufficient water frontage along the Houston Ship Channel for a ship dock to accommodate the largest ship anticipated to berth at the site.
3. Sufficient area for safety and navigability of incoming and outgoing vessel traffic.
4. Proximity to TLC's processing facility so that imported material can be unloaded directly into processing facility building, minimizing handling of the material.
5. Sufficient on-site railroad tracks and roadways to queue railcars and trucks.

4.0 IDENTIFY ALTERNATIVES

The alternatives considered for this project are discussed in this section. A total of nine alternatives were considered including the applicant's preferred alternative, three other on-site alternatives, four off-site alternatives, and a no action/no build alternative.

4.1. On-Site Alternatives

Alternative 1 site (applicant's preferred site) at 9500 Clinton Drive in Houston, Texas (29° 43' 34.22" N, -95° 15' 07.10" W) is the current location of TLC's processing facility. The 16.5-acre tract of land is owned by TLC and has existing access to rail lines, interstate highways, and the Houston Ship Channel. Alternative 1 site includes 1,100 linear ft. of waterfront property along the Houston Ship Channel, portions of which are currently hard armored with concrete bulkhead and steel sheet piling. There is a former rail spur located on the site and an existing rail line adjacent to the site along Clinton Drive. The nearest interstate highway is approximately ½ mile from the site. Existing infrastructure on the Alternative 1 Site includes the ~276,000-square foot processing building.

To meet the project purpose and need, construction of a new dock to accommodate and unload ships importing the overseas raw material, construction of additional railroad tracks to accommodate and queue 40 rail cars, and construction of an on-site roads to accommodate and queue trucks would be required. Alternative Site 1 has sufficient water frontage along the Houston Ship Channel for a ship dock large enough to accommodate the largest ship anticipated to berth at the dock. Additionally, nearby rail and truck routes could be easily accessed from Alternative Site 1, once on-site access infrastructure was established. Sufficient on-site land area is available to construct this infrastructure, including railroad tracks to queue 40 rail cars. Since Alternative Site 1 is the same location as TLC's processing facility, the imported material can be unloaded directly into the processing facility building, minimizing material handling.

Potentially jurisdictional waterbodies or wetlands identified at Alternative Site 1 include the Houston Ship Channel (E1UBLx) and palustrine rock bottom (rubble) wetlands (PRB2) developed adjacent to the Houston Ship Channel likely from drainage of the adjacent uplands.

On-site alternatives were considered to determine the optimal project design that would fulfill project need and purpose while minimizing adverse impacts to the maximum extent practicable. A total of four on-site alternatives were evaluated based on the project criteria outlined in Section 3.0.

4.1.1. Alternative 1A

Alternative 1A involves developing the TLC-owned property at 9500 Clinton Drive. Alternative 1A includes construction of ~1270 ft. of sheet pile bulkhead along Alternative 1 site's existing shoreline in front (waterward) of the existing bulkhead and construction of a 615.5 ft. long by 45.5 ft. wide dock. This alternative would fill approximately 0.074 acres of palustrine rock bottom (rubble) wetland behind the proposed bulkhead. Approximately 13 acres within the Houston Ship Channel would be dredged to a depth of 41.5 ft. (37.5 ft. plus 2 ft. of advanced dredge and 2 ft. of overdredge) resulting in approximately 383,600 cubic yards of dredged material. Based on conversations with the Houston Pilots, Alternative 1A would not be acceptable because the location of the dock would interfere with navigational safety of incoming and outgoing vessel traffic. Alternative 1A would result in approximately 0.074 acres of permanent discharge to palustrine rock bottom (rubble) wetland resulting from construction of and fill behind the bulkhead. Alternative 1A results in less permanent impacts to wetlands than Alternative 1D (applicant's preferred alternative), however, this alternative is impracticable due to navigational safety concerns. Refer to Appendix A, Figure 1 for a depiction of the bulkhead configuration for Alternative 1A.

4.1.2. Alternative 1B

Alternative 1B addresses the navigational safety concerns of the Houston Pilots by placing the proposed bulkhead and dock a greater distance away from the limits of the ship channel than Alternative 1A. Alternative 1B locates the fender line of the proposed dock at a minimum of 225 ft. setback from the limit of the Houston Ship Channel. With this alternative, most of the proposed bulkhead and dock is located in an area that is currently uplands. Portions of the proposed bulkhead not completely in uplands will be placed near the existing shoreline to reduce the amount of fill behind the bulkhead in waters of the U.S. Alternative 1B would result in approximately 0.074 acres of permanent discharge to palustrine rock bottom (rubble) wetland resulting from construction of and fill behind the bulkhead.

Approximately 14.3 acres within the Houston Ship Channel would be dredged for Alternative 1B. The 14.3 acres includes approximately 1.2 acres of uplands that will be excavated to create waters of the U.S. and 13.1 acres of existing waters of the U.S. The 14.3 acres would be dredged to a depth of 45.5 ft. (41.5 ft. plus 2 ft. of advanced dredge and 2 ft. of overdredge) resulting in approximately 508,470 cubic yards of dredged material.

The existing layout of the processing facility includes rail and truck loading operations on the west side of the building, with existing railroad tracks located both inside and directly outside the building. This existing layout follows the optimized operational flow of material and, in order to achieve the proposed project's objectives, construction of additional railroad tracks and roadways are needed on the west side of the building to accommodate increased site traffic. The layout for Alternative 1B locates the proposed bulkhead, roads, and rails in a small area adjacent to the processing building. Due to the proximity to the building, the bulkhead in this area is not expected to have tie backs. Structural analysis of this alternative determined that additional clearance between the proposed rail/road and proposed bulkhead is required to mitigate the surcharge loads exerted on the proposed bulkhead by the proposed rail/road loadout.

Alternative 1B results in less permanent impacts to wetlands than Alternative 1D (preferred alternative), however, this alternative is impracticable due to the surcharge loads exerted on the proposed bulkhead by the proposed rail/road loadout. Refer to Appendix A, Figure 2 for a depiction of Alternative 1B for the proposed project.

4.1.3. Alternative 1C

To mitigate surcharge loads on the bulkhead discussed in Alternative 1B section above, Alternative 1C extends the bulkhead on the northwest end further along the dock and 100 ft. beyond the proposed dock before turning back to the land. This configuration provides additional clearance between the proposed bulkhead and the proposed rail/road to mitigate the surcharge loads exerted on the proposed bulkhead. Refer to Appendix A, Figure 3 for a depiction proposed bulkhead configuration for Alternative 1C.

Alternative 1C results in permanent discharge to approximately 0.27 acres of palustrine rock bottom (rubble) wetland and approximately 0.25 acres of estuarine subtidal unconsolidated bottom subtidal excavated wetlands from construction of, and fill behind, the bulkhead.

Approximately 14.3 acres within the Houston Ship Channel would be dredged to a depth of 45.5 ft. (41.5 ft. plus 2 ft. of advanced dredge and 2 ft. of overdredge) for Alternative 1C resulting in approximately 508,470 cubic yards of dredged material. The 14.3 acres includes the approximately 1.2-acre area of uplands that will be excavated to create waters of the U.S. and 13.1 acres of existing waters of the U.S. Therefore, Alternative 1C would result in a net increase of 0.95 acres of estuarine subtidal unconsolidated bottom subtidal excavated wetlands.

4.1.4. Alternative 1D (Preferred Alternative)

Like Alternatives 1B and 1C, Alternative 1D locates the fender line of the proposed dock at a minimum 225 ft. setback from the limit of the Houston Ship Channel to eliminate navigational safety concerns of the Houston Pilots and places most of the proposed bulkhead in uplands.

To reduce the amount of fill in waters of the U.S. compared to Alternative 1C, Alternative 1D extends the bulkhead on the northwest end along the dock by approximately 55 ft. and then turns back to the land. This configuration provides necessary clearance between the proposed bulkhead and the proposed rail/road to mitigate surcharge loads from the proposed rail/road loadout exerted on the bulkhead, while also reducing the amount of fill in WOUS (compared to other proposed Alternatives).

Alternative 1D would result in approximately 0.27 acres of permanent discharge to palustrine rock bottom (rubble) wetland and 0.09 acres of estuarine subtidal unconsolidated bottom subtidal excavated wetlands (E1UBLx) resulting from construction of and fill behind the bulkhead. For Alternative 1D, a total of 14.3 acres will be dredged within the Houston Ship Channel including approximately 1.2-acre area of uplands that will be excavated/dredged to create open water and 13.1 acres of existing open water. Therefore, Alternative 1D would result in a net increase of 1.11 acres of estuarine subtidal unconsolidated bottom subtidal excavated wetlands. The 14.3 acres would be dredged to a depth of 45.5 ft. (41.5 ft. plus 2 ft.

of advanced dredge and 2 ft. of overdredge) resulting in approximately 508,470 cubic yards of dredged material.

Refer to Appendix A, Figure 4 for a depiction of proposed bulkhead configuration for Alternative 1D.

4.2. Off-Site Location Alternatives

Four off-site alternatives were considered. Refer to Appendix A, Figure 5 for a depiction of locations of off-site alternatives considered.

4.2.1. Alternative 2

Alternative 2 site (29° 43' 27.38" N, -95° 15' 00.08" W) is located at 9550 Clinton Drive, adjacent to the TLC processing facility. The Alternative 2 site, owned by Houston Cement Company (HCC), is an existing operational cement terminal with a single dock, a rail spur, storage vessels, and loading facilities. Use of the existing dock and construction of infrastructure to convey cement related product unloaded at the dock to the TLC processing facility building on the adjoining property was evaluated. The existing HCC dock is currently only capable of unloading via a pneumatic system and not a mechanical system. Using an existing dock would not result in impacts to special aquatic sites, however, a single shared ship dock is not an operationally/logistically viable option to meet the project need and purpose. Additionally, a shared dock and permanently mounted mechanical conveyors would interfere with Houston Cement Company's current operations.

4.2.2. Alternative 3

Alternative 3 site (29° 44'32.14" N, -95° 07' 02.92" W), located at 15902 Peninsula Street and currently owned by Harridan Limited Partnership, is a 65-acre with over 1,000 ft. of bulkheaded waterfront on the Houston Ship Channel and two docks. The draft at west slip is 34 ft. and the draft at channel dock is 38 to 52 ft. Minimum required draft for the proposed project is 41.5 ft. initially and 45.5 ultimately. Therefore, the west dock would not meet the project need and purpose, but the channel dock would. Other existing infrastructure on the tract includes two buildings and railroad tracks operated by the Port Terminal Railroad Association. Alternative 3 site is located more than 8 miles from the TLC processing facility eliminating the ability to unload imported raw material directly from the overseas ships to the processing building. Alternative 3 does not meet the project's need and purpose since the imported raw material cannot be unloaded directly from the overseas ships to the processing building. At the time of this analysis, sale of this property to a party other than TLC was pending.

4.2.3. Alternative 4

Alternative 4 site (29° 44'33.45" N, -95° 06' 56.41" W), located at 16182 Peninsula Street, is a 23.8 acre lot currently for sale. The property has access to highways, railways, and the Houston Ship Channel with water frontage of 862 ft. Infrastructure on the property includes buildings, railroad tracks, large tanks, a partially bulkheaded waterfront, and a dock. The existing dock is not sufficient for the anticipated ship size transporting the imported raw

material for the processing facility. The existing dock is approximately 270 feet long which is 345 feet less than the proposed dock design is 615 feet. A new dock capable of accommodating larger ships would be necessary. Backfill behind a bulkhead would fill approximately 0.01 acres of wetlands. However, due to the proximity of a neighboring dock, there is insufficient area to safely navigate and dock the planned ship size at site while a ship is docked at the neighboring property. Additionally, Alternative 4 site is located more than 8 miles from the TLC processing facility eliminating the ability to unload imported raw material directly from the overseas ships to the processing building. Alternative 4 does not meet the project's need and purpose since the imported raw material cannot be unloaded directly from the overseas ships to the processing building.

4.2.4. Alternative 5

Alternative 5 (29° 44' 34.39" N, -95° 06' 34.08" W), located at 16530 Peninsula Street, is a 7.78 acre lot currently for sale. The property has access to highways, railways, and the Houston Ship Channel with a frontage of 800 ft. and a 390 ft. concrete bulkhead. Other infrastructure on the property includes five buildings, 250 linear ft. of rail, and a barge slip. Alternative 5 site would require construction of more railroad tracks and a dock. The barge slip would be filled to construct the bulkhead and dock, which would result in filling approximately 0.3 acres of open water. Additionally, Alternative 5 site is located more than 8 miles from the TLC processing facility and does not meet the need and purpose of this project since the imported raw materials cannot be unloaded directly from the overseas ships to the processing building.

4.3. No Action Alternative

The no action alternative considered was to not build a facility to import, warehouse, and transload cement related products. The no action alternative does not result in impacts to the aquatic ecosystem. However, the no action/no build alternative would not fulfill project need and purpose, which is to further develop property with access to interstate highways, rail lines, and intracoastal water with a dock to unload imported cement related products from ships, a warehouse to store the products, and a rail spur to load/unload rail cars. Construction of the proposed project would provide the necessary infrastructure to fulfill the need. The no action alternative does not meet the project need and purpose.

5.0 PRACTICABILITY ANALYSIS

The practicability of each alternative was evaluated. For an alternative to be considered practicable, it must be available and capable of being completed after considering cost, existing technology, and/or logistics in light of the overall project purpose.

The following table provides a summary of the practicability analysis completed for the alternatives.

Table 1. Alternative Comparison Matrix for Practicability

Practicability Category	On-Site Alternative				Off-Site Alternative			
	1A	1B	1C	1D	2	3	4	5
Factor								
Available Property Available for Acquisition	Yes; Applicant owns the property				Yes; Applicant would have to negotiate a lease agreement	No; Sale pending (to another party)	Yes; Applicant would have to purchase	Yes; Applicant would have to purchase
Logistics Proximity to and Ability to Unload Imported Raw Material Directly to TLC Processing Facility Building	Yes; Located on same property as processing facility				Yes; Adjacent property to processing facility	No; ~8 miles (straight line distance)	No; ~8 miles (straight line distance)	No; ~8 miles (straight line distance)
Sufficient Area for Infrastructure and Operations	No; See Note 1	No; See Note 1	Yes	Yes	No; 25.7 acres See Note 2	Yes; 65 acres	Yes; 23.8 acres	No; 7.78 acres
<p>Note 1: Structural analysis for these alternatives determined that additional clearance between the proposed rail/road and the proposed bulkhead is required to mitigate the surcharge loads exerted on the proposed bulkhead by the proposed rail/road loadout.</p> <p>Note 2: Infrastructure and operations for the proposed project would interfere with existing operations of current property owner. Shared dock limits operations.</p>								
Existing Zoning Appropriate	Yes; Zoned Industrial				Yes; Zoned Industrial	Yes; Zoned Industrial	Yes; Zoned Industrial	Yes; Zoned Industrial
Direct Access to Houston Ship Channel	Yes				Yes	Yes	Yes	Yes
Access to Rail Lines	Yes				Yes	Yes	Yes	Yes
Access to Highway	Yes; 1 mile to Highway 610				Yes; 1 mile to Highway 610	Yes; 2 miles to Beltway 8	Yes; 2 miles to Beltway 8	Yes; 2 miles to Beltway 8

Practicability Category	On-Site Alternative				Off-Site Alternative			
	1A	1B	1C	1D	2	3	4	5
Factor								
Existing Infrastructure	No; No dock, but waterfront is suitable to construct dock				Yes; Existing dock, shared use of dock not feasible	Yes; Two existing docks, one sufficient for planned ship size	No; Existing dock not sufficient for planned ship size	No; No existing dock
Safety and navigability of incoming and outgoing vessel traffic	No; See Note 3	Yes	Yes	Yes	Yes	Yes	No; See Note 4	Yes
Note 3: Alternative 1A bulkhead configuration and dock location interferes with navigational safety of incoming and outgoing vessel traffic. Note 4: Neighboring dock provides insufficient area for navigability and docking of planned ship size.								
Existing Technology	Yes	Yes	Yes	Yes	Yes	Yes; See Note 4	Yes	Yes
Topography and Other Site Conditions Feasible for Construction								
Cost	Low	Low	Low	Low	Low	High	High	High
Acquisition Costs								
Construction Cost	High	High	High	High	Moderate	Moderate	High	High
Project Purpose	No	No	Yes	Yes	No	No	No	No
Achieves Project Purpose								
Practicable Alternative	NO	NO	YES	YES	NO	NO	NO	NO

The specific reason(s) each alternative was deemed practicable or not practicable is listed below:

- The no action/no build alternative is not a practicable alternative because it does not fulfill project need and purpose.
- Alternative 1A was determined to not be practicable due to navigational safety concerns. The proposed location of the dock for Alternative 1A would impede ship safety and navigation.
- Alternative 1B was determined to not be practicable due to the surcharge loads exerted on the proposed bulkhead by the proposed rail/truck loadout.
- Alternative 1C is a practicable alternative. This alternative meets the project siting criteria and achieves the project need and purpose. Alternative 1C impacts 0.25 acres of estuarine subtidal unconsolidated bottom subtidal excavated wetlands and 0.27 acres of palustrine rock bottom (rubble) wetland.
- Alternative 1D is a practicable alternative. This alternative meets the project siting criteria and achieves the project need and purpose. Alternative 1D impacts 0.09 acres of estuarine subtidal unconsolidated bottom subtidal excavated wetlands and 0.27 acres of palustrine rock bottom (rubble) wetland.
- Alternative 2 was determined to not be practicable since shared use of a single dock and the infrastructure needed to unload the overseas ships directly into the processing building would interfere with existing operations of Alternative 2 site's property owner.
- Alternative 2 is operationally/logistically viable option to meet the project need and purpose. Additionally, a shared dock and permanently mounted mechanical conveyors would interfere with Houston Cement Company's current operations.
- Alternative 3 was determined to not be practicable because the property is not available (sale of property to another party pending at the time of this analysis). Additionally, since Alternative 3 is located more than 8 miles from the TLC processing facility, the alternative does not meet the project's need and purpose since the imported raw material cannot be unloaded directly from the overseas ships to the processing building.
- Alternative 4 is not practicable because the location of the neighboring dock provides insufficient area for safe navigation and docking of planned ships. Also, Alternative 4 site is located more than 8 miles from TLC's processing facility eliminating the ability to unload the imported material directly into the processing building and not meeting the project's purpose and need. Transporting material via rail and/or truck from Alternative 4 site is not logistically practicable.
- Alternative 5 site is also located more than 8 miles from TLC's processing facility eliminating the ability to unload the imported material directly into the processing building. Material received at this location would require extra handling, such as loading/unloading into trucks and/or rail cars for transport to processing facility, thereby impeding the unloading process and increasing the potential for material contamination. Alternative 5 does not meet the project's need and purpose since the imported raw material cannot be unloaded directly from the overseas ships to the processing building.

6.0 LEAST ENVIRONMENTALLY DAMAGING PRACTICAL ALTERNATIVE ANALYSIS

The practicable alternatives were compared to determine the least environmentally damaging practicable alternative (LEDPA). The following table provides a summary of the LEDPA analysis completed for the practicable alternatives identified in Section 5.0.

Table 2. Environmental Factor Matrix

Environmental Factor	Alternative 1C	Alternative 1D
Potential impacts on physical and chemical characteristics of non-living environment	Minimal Impact; Temporary turbidity is possible during construction operations; no lasting water quality pollution will occur; project will not change the direction of or obstruct water flow or normal water patterns and fluctuations	Minimal Impact; Temporary turbidity is possible during construction operations; no lasting water quality pollution will occur; project will not change the direction of or obstruct water flow or normal water patterns and fluctuations
Potential impacts on biological characteristics of the aquatic ecosystem	No Impact; Project will not impact threatened and endangered species or their habitat; fill material(s) will be non-contaminated	No Impact; Project will not impact threatened and endangered species or their habitat; fill material(s) will be non-contaminated
Potential impacts on special aquatic features	Minimal Impact; The project will fill 0.27 acres of wetlands	Minimal Impact; The project will fill 0.27 acres of wetlands
Potential impacts to open waters	Beneficial Impact; The project will fill 0.25 acres of open water, but create 1.2 acres of open water, resulting in a net increase of 0.95 acres of open water	Beneficial Impact; The project will fill 0.09 acres of open water, but create 1.2 acres of open water, resulting in a net increase of 1.11 acres of open water
Potential impacts on human use characteristics	No Impact; Project will not impact municipal or private water supplies; project will not impact recreational or commercial fisheries; project will not impact aesthetics	No Impact; Project will not impact municipal or private water supplies; project will not impact recreational or commercial fisheries; project will not impact aesthetics
LEDPA	NO	YES

7.0 LEAST ENVIRONMENTALLY DAMAGING PRACTICAL ALTERNATIVE DETERMINATION

This analysis was completed based on comprehensive knowledge of the requirements to complete a project in this environment. The information was assembled to further justify the preferred project site location and design with consideration to environmental impacts and constructability concerns. The preferred project location and design was selected as it presents the lowest potential for environmental impacts, constructability concerns, and hazard to project personnel while accomplishing the project purpose and need.